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THE RANGE OF *COTTUS ALEUTICUS*

In a recent number of this journal, Crawford (1927, p. 177) gave an apparent southward extension of the range of *Cottus aleuticus*. Nearly twenty years ago, however, Snyder (1908, p. 188) recorded the species from numerous localities in Oregon and even from Carmel River, central California. Later, the same author (1913, pp. 55, 72) mentioned the occurrence of *C. aleuticus* in the streams tributary to Monterey Bay, California. More recently (Hubbs, 1921, p. 7) I extended the range of the species to San Luis Obispo County, California, more than eight hundred miles south of Crawford's record.

I write this note with the idea of pointing out how unsafe it is, in working on North American fishes, to ignore the ichthyological literature which has been published during the quarter century since Jordan and Evermann's great work appeared. This practice has by no means been confined to the author whose note is under review, and therefore the criticism is not specifically directed at him. We should always keep in mind that the twentieth century has witnessed a considerable progress in the field of North American ichthyology.

CRAWFORD, D. R.

1927 "Extension of the Range of *Cottus aleuticus*."

Copeia, No. 160, pp. 177-178.

HUBBS, CARL L.

1921 "Notes on *Cottus asper* and *Cottus aleuticus*."

Copeia, No. 90, pp. 7-8.

SNYDER, JOHN OTTERBEIN

1908 "The Fishes of the Coastal Streams of Oregon and Northern California."

Bul. U. S. Bur. Fish., 27, 1907, pp. 155-189

1913 "The Fishes of the Streams Tributary to
Monterey Bay, California."

Bul. U. S. Bur. Fish., 32, 1912, pp. 49-72.

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BLACK-NOSED DACE IN NORTH CAROLINA

Rhinichthys atronasus (Mitchill), until recently, had not been recorded in North Carolina from streams of the Atlantic drainage, although the state is within the limits of its distribution. Smith, in "Fishes of North Carolina", N. C. Geological and Economic Survey, Vol. II, p. 101, says of this species: "In North Carolina it has a very limited distribution, being recorded in the state only in tributaries of the French Broad" (Mississippi drainage). In September, 1922, I found it very abundant in Pine branch, a small tributary of Linville River, just above Linville Falls, and in the river itself (Atlantic drainage). In Pine branch it was the only common fish, although there were occasional black suckers, *Catostomus nigricans*, and rainbow trout. As compared with the suckers, the ratio of abundance was 62:3. Examples taken varied in length from 15 to 85 mm., the majority being from 41-50 mm., presumably second year fish.

Local residents distinguished specimens with reddish brown side bands (males) as "branch minnows" from the black-banded examples (females and immature males?) as "slick-heads". The fish were then (early September) in breeding condition, females 70-80 mm. in length being full of eggs, 0.6-0.66 mm. in diameter, easily separable, and readily extruded.

R. E. COKER

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THE EUROPEAN RUDD (*SCARDINIUS*) IN WISCONSIN

A note by Mr. G. S. Myers on the European Rudd in New Jersey* suggests to me that it might be of interest to record a relatively recent and successful introduction of this species (*Scardinius erythrophthalmus* (Linn.)) into Oconomowoc lake, Waukesha county, Wisconsin. In 1916, Mr. B. O. Webster, superintendent of fisheries for the state of Wisconsin, made a trip to New York at the instigation of Mr. Fred Pabst of Oconomowoc, and brought back with him seven cans containing about 300 fish of this species. These were obtained from the New York aquarium through the courtesy of Dr. Townsend. They were planted at the northeast corner of Oconomowoc lake, and they seem to have done reasonably well since their transplantation. In 1920 I located the fish quite by accident when I caught one specimen, at that time an unknown species to me. Since then I have taken four more, one (1923) less than three inches long, indicating that the fish are breeding in their new environment. Besides these four, one specimen was brought to me by a fisherman for identification. In no case have I found the fish more than half a mile from the site of the original planting, but they have distributed themselves along the deep water bars, and are living amid Potamogeton and Vallisneria in water varying from ten to fifteen feet in depth. They either are not voracious biters or they are not very numerous (I suspect the latter) as I am able to get very few specimens—none, in fact, during the last two years.

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*Copeia, No. 140, Apr. 14, 1925, p. 20.

OBSERVATIONS ON THE FOOD HABITS OF TEXAS AMPHIBIANS AND REPTILES

Some years ago, I read an article by a university professor who wrote of his experiments in testing the discriminative ability of a certain species of freshwater turtle. His results were largely negative, his subjects failing to react to his satisfaction in tests intended to determine their ability to distinguish color, sound, direction and other appeal to sensory impulse. No one need expect to accomplish results with reptiles which have been long kept under unnatural conditions far from their natural habitats and environments. The majority of species in zoölogical gardens which refuse to eat do so on account of their surroundings being more or less artificial or their cage temperatures being either too low or too dry.

I have conducted experiments with captive reptiles and many of them have been highly gratifying but in nearly all of these cases, the animals were natives of this state. One alien, a Gila Monster (*Heloderma suspectum* Cope) lived in a box cage in my office for more than a year—as long as I could conveniently keep it in a living condition—and during this time it moulted twice and ate eggs regularly. Whenever it displayed signs of being in a morbid condition, I placed its cage in a window where it could get the full benefit of the sun's rays and in a short time it would again act naturally.

A five-foot *Crotalus atrox* went through a successful moult while confined in a cage made from an Arbuckle coffee box. This snake would rattle furiously whenever any person walked between its cage and the light from a window, but absolutely refused to react to sounds such as the stamping of feet or the blowing of a whistle.

A private terrarium, where specimens are free from the attentions of visitors, is the best place in which to study captive cold-blooded vertebrates. Some

closet naturalists seem to think that the majority of reptiles constantly maintain themselves on the same diet but this is not true. A usual method of feeding captive specimens is to drop some supposed tid-bit into the cage and then let the animal either accept or reject it. (I am not here criticising keepers of public zoölogical collections—these men use every effort to induce their captives to feed; it is a certain class of college zoölogists that I am discussing!)

Experiments conducted with reptiles *in the same section of country they inhabit* indicate that a few species will feed upon almost anything of an animal nature that is offered to them—insects of many kinds, earthworms, crustaceans (*Oniscus*), small mammals, young sparrows, bird's eggs, small fish, etc. Some species of snakes not supposed to be cannibalistic will eat other snakes, in some cases the young of their own species. A few snakes seem to be on special diet but some former peculiar environment may be responsible for this. Numerous specimens of a water snake (*Natrix grahamii* Baird and Girard) which inhabited a small lagoon where crayfish were abundant, were feeding almost entirely on these crustaceans. In a small stream where crayfish were scarce, the same snake was subsisting on minnows and cricket frogs.

During the years 1923 and 1924, my young friend, I. A. Goldstein, made successful food experiments with many captive reptiles and amphibians. Numbers of his specimens fed freely, some even which represent species supposed to be too nervous to long bear confinement. When one of his pets showed a disposition to fast at the expense of its physical condition, it was carried back to its former haunts and released. Young Goldstein possessed originality and deviated from set rules—if an animal refused one thing, he very promptly experimented with something else. The main object was to induce them to feed willingly and at the same time to discover their preference.

Young Goldstein's "family", as he termed it, at one time consisted of more than two hundred specimens, and in order to provide them with a variety of food, it then required most of his waking hours in seining for small fish, chasing toads and frogs, netting insects, and digging into ant-beds and rotten wood for larvae.

On the first of April, 1923, a large larval specimen of the tiger salamander (*Ambystoma tigrinum* (Green)) was received by the Biological Department of Baylor University from Plainview, Texas. It was presented to me on the eighth of April and on that date was transferred to Goldstein's terrarium. By June third it had completed its transformation to the land form. During the last five weeks of its existence as an axolotl, it frequently rose to the surface of the water for air. In one month it moulted its skin at least three times. Its appetite was voracious and it consumed numbers of recently transformed toads, sowbugs, crickets and earthworms. In one week's time, it ate six young toads (*Bufo valliceps* Wiegmann). After completing its metamorphosis, it continued to eat greedily and it was a difficult matter to keep it supplied with food. Its growth was rapid and by August first it was a perfect giant for its species, fully ten inches in total length. During July, it ate at least ten young tailless amphibians—tiny toads and cricket and chorus-frogs.

Goldstein's small-mouthed salamanders (*Ambystoma microstomum*) ate earthworms, sowbugs and insect larvae. His toads (*Bufo valliceps* and *B. americanus*) were not over particular but subsisted on a varied diet consisting of sowbugs, earthworms, beetles, bugs (*Hemiptera*), small grasshoppers and caterpillars. One bull-frog ate a good-sized lined snake (*Tropidoclonium lineatum*).

Five species of lizards were living in the terrarium at one time. Of these, the so-called "chameleon" (*Anolis carolinensis*), was the most discriminating

feeder and refused everything but house flies. The tree swift (*Sceloporus spinosus floridanus*) disposed of quantities of crickets, small cockroaches, beetles and beetle larvae. The horned "toad" (*Phrynosoma cornutum*) showed a decided preference for ants and small beetle larvae. The ground lizard (*Leiolepis laterale*) was partial to small larvae, as also was the rare skink (*Eumeces pachyurus* (Cope)).

The diamond water snake (*Natrix rhombifera*) fed freely upon leopard-frogs, young bull-frogs, and fish. The lined snake (*Tropidoclonium lineatum*) preferred earthworms but varied this diet by eating an occasional sowbug or bombardier beetle. A large *Heterodon contortrix* devoured several small toads and an adult *Coluber constrictor flaviventris* was particularly fond of half-grown lined snakes.

The *Testudinata*, with the exception of the terrestrial species, were very eccentric in their feeding. In a lot of four or five specimens of the same species, no two would show the same preference. *Amyda emoryii* preferred fish but could exist on raw beef. *Kinosternon flavescens* and *K. subrubrum hippocrepsis* both would accept meat but preferred insects and small mollusks (*Planorbis* and *Limnaea*). One specimen of *flavescens* killed and ate a portion of a small lined snake after it had divided it into sections of suitable length. *Pseudemys elegans* accepted meat, fish, grasshoppers and crickets. One half-grown specimen of the last-mentioned turtle was fond of sowbugs and ate numbers of them. Experiments with *Pseudemys texana* were a failure; this species in its natural environment feeds almost entirely on *Mollusca*—*Sphaerium*, *Planorbis* and *Limnaea*—as I have determined by dissection.

JOHN K. STRECKER

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SOME RECORDS OF AMPHIBIANS AND REPTILES FROM NORTH CAROLINA

Triturus viridescens. Croatan, April 17, 1925, one with the red spots somewhat elongate, thus approaching *dorsalis*.

Ambystoma microstomum. A salamander taken by Mr. W. B. Mabree, Extension Entomologist in the lowgrounds of Black River, near Dunn, N. C., on May 12, 1923, appears to be either this or else a new species. In life the animal was brown above with lighter spots on the sides, but in preservative the brown of the back and the lighter marks practically disappeared leaving the specimen nearly uniformly dark above and paler below. Mr. S. C. Bishop is now working on its exact identity.

Plethodon glutinosus. A number taken under logs in a pasture near Bryson City on May 24, 1925, show a remarkable but varying degree of lack of dark pigment on the legs and underparts so as to present an entirely different appearance from normal specimens. One taken in woods the same day and within sight of the said pasture was wholly normally dark as usual.

Plethodon jordani. Taken by Mr. Franklin Sherman at Nellie, Haywood county, June 14, 1924, and at Indian Pass, Swain county, July 10, 1926.

Plethodon yonahlossee. Taken by Mr. Sherman near Linville Falls, May 30 and June 1, 1920.

Aneides aeneus. On September 4, 1924 at Swananoa, a Mr. Swain who lived there told me that on the previous day he had seen a "lizard" under a stone at the foot of a tree that was covered on back and sides with large greenish yellow markings and numerous questions failed to make his description agree with any other known salamander. The possibility of the said specimen being this species is increased by the capture on Mt. Pinnacle, S. C., of an *A. aeneus* on August 3, 1926 by Mr. J. O. Pepper of Clemson College.

Stereochilus marginatus. Goldsboro, two larvae, 60 and 63 mm. long in a swamp pool on April 14, 1925. Catherine Lake, nine in a swamp pool, all larvae, 50 to 75 mm. long, April 16, 1925, one had about lost its gills. I think they must transform to the adult in May.

Pseudotriton ruber nitidus. One under log at Coggins Gap near Swannanoa, May 26, 1923

Pseudotriton ruber schencki. Three under logs in pasture at Cullasaja, May 23, which is the identical situation in which I have taken most of my specimens.

Gyrinophilus danielsi. Two at Nellie, June 14, 1924, by Mr. Sherman, and one by myself on Cowee Mountain between Sylva and Franklin, May 22, 1923.

Bufo americanus. Bryson City, May 24, 1923, Swannanoa, May 27, 1923, two at each place.

Bufo terrestris. Catherine Lake, April 16, 1925, breeding in some numbers. Pungo Lake, May 27, 1925, four under logs. Found to be common in Pamlico county near Oriental in July, 1925 and 1926 by Dr. Cunningham of Duke University.

Scaphiopus holbrooki. One taken in the lowgrounds of the French Broad in Henderson county years ago (J. S. Holmes, State Forester in letter). Taken in summer of 1923 at Beaufort (Dr. O. W. Hyman in letter).

Pseudacris ocularis. Havelock, thirteen young taken May 15, 1923. Ayden, one July 8, 1925. Castle Hayne, July 13, 1925, one. All were hopping about on and among vegetation more like grasshoppers than frogs and all were taken in low damp open but somewhat shaded situations.

Hyla andersoni. Southern Pines, June, 1920, taken by W. T. Davis and J. P. Chapin. (Journal New York Entomological Society, 1922, Vol. XXX, p. 74). I repeat the record as few herpetologists read entomological journals.

Hyla cinerea. Oriental. July, 1926, Dr. Cunningham.

Hyla femoralis. Dixon, Onslow county, July 11, 1925, one.

Rana virgatipes. Southern Pines, taken by Davis and Chapin in June, 1920. Fayetteville, heard June 4, 1921. Wenona, May 26, 27, 1925, several along one of the smaller canals.

Abastor erythrogrammus. Wilmington, May, 1920, M. Kisliuk.

Farancia abacura. Kinston, May 14, 1923, one picked up dead in the road.

Coluber flagellum. Mr. Kornegay of the Garden Spot Nursery, told me on July 9, 1925, that one nine feet long had been killed near Kinston about two weeks before. The largest I have seen was from Pender County and measured seven and one-half feet.

Pituophis melanoleucus. One picked up dead between Vass and Southern Pines, by T. B. Mitchell, May 24, 1925. One taken alive by M. H. Davis at Hoffman May 29, 1926. One taken in Brunswick County, seven miles west of Wilmington by Carl G. Knox in spring of 1926.

Lampropeltis rhombomaculatus. Rocky Mount, September, 1926, one small one, M. H. Davis.

Clemmys guttata. Taken in Duplin, Beaufort, Pender, Onslow and Washington counties in 1923, 1924, and 1925.

Chrysemys picta. Observed in Craven (June, 1922) Cumberland (June, 1921) Johnston (November, 1923), Vance (March 1925).

Pseudemys scripta. Fayetteville, May 29, 1920; Laurel Hill, June 2, 1922. Wilmington, June 20, 1923.

C. S. BRIMLEY

Raleigh, N. C.

RATTLESNAKE EGGS IN IOWA

On May 5, 1926, I received from Mr. William E. Fleming, a pair of massasauga rattlesnakes, *Sistrurus catenatus catenatus* taken near together at Shannon

City in southern Iowa, where they are still fairly common.

Both were plainly marked, though very dark. They are known locally as the "gray rattlesnake". They were quiet and appeared little excited by the handling incident to uncrating.

On May 7, at three different times the male, which measured about 29 inches was seen trying to mate with the female which was about 3 inches longer. She seemed entirely passive. The tail of the male was wrapped entirely around the other, with the vents near together but not in contact. The male showed a sort of spasmodic twitching, mainly of the posterior half but sometimes of the entire body. At one time his head exhibited excitement; the tongue frequently darting far out and the head being thrust about above the body of the female, who paid not the slightest attention. This happened both in the morning and in the afternoon.

During the summer the pair have refused to eat although tempted with frogs and mice. They drank frequently and molted twice. As is usual with the pit vipers several pairs of poison fangs were shed, swallowed and passed through the digestive tract. They have seldom rattled and have never been seen to strike at anyone in front of their cage.

During the night of October 21, the female laid seven eggs in the cage. These were solid, yellowish yolks without trace of shell or any membranes aside from the vitelline membrane or yolk skin. They averaged about 34 mm. by 20 mm. in size, although there was considerable variation in both size and shape. On the following night six more eggs were laid.

As no development had taken place the attempted mating five and one-half months before had evidently proved unsuccessful but the sterile eggs had been retained for at least the full normal period before young snakes would have been born.

Probably under natural out-door conditions the

production of eggs by an ovoviviparous snake would be of very rare occurrence if it ever happens. The above note, however, suggests a possible source of error in determining by observation the reproductive habits of little-known species of snakes.

J. E. GUTHRIE

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NOTES ON WATER SNAKES RALEIGH, N. C.

The notes below all relate to water snakes (*Natrix sipedon*), kept in the State Museum this summer (1926) by Mr. H. T. Davis of that institution.

1. FEEDING HABITS. Mr. Davis found that they would not only eat live frogs and fish, but also dead fish, pieces of fish and even pieces of raw, red, beef. On one occasion he gave them some small live active frogs, presumably cricket frogs (*Acris*), and found that when one was swallowed by one of the larger snakes it would turn around as soon as it had got into the throat and hop out again, one frog having to be swallowed three times before it would stay down.

2. VARIATION IN COLOR PATTERN OF YOUNG SNAKES OF THE SAME BROOD.

Number of complete anterior crossbars	Brood 1 Sept. 3, 1926	Brood 2 Sept. 9, 1926
5	1	0
6	2	0
7	3	0
8	2	0
9	4	1
11	2	0
12	3	3
13	1	0
14	0	1
15	0	1
17	0	1

18	1	0
20	0	1
25	1	0
all before vent	2	1
	<hr/>	<hr/>
Total	22	9

The mother of brood 1 had eleven complete crossbars about the same as the average of her offspring; the mother of brood 2 had about the anterior two-thirds of the crossbands in front of the vent complete, while the posterior third had the bands complete on one side but alternating with spots on the other.

The appearance in both broods of one or more specimens with all crossbars complete shows that this one character alone will not necessarily identify a water snake (at least in this region) as *fasciata* rather than *sipeclon*.

C. S. BRIMLEY

Raleigh, N. C.

A NOTE ON THE MOUSE, *MUS MUSCULUS* LINN., AS AN ENEMY TO LIZARDS

From September 27 to 29, inclusive, 1925, I liberated thirty specimens of *Crotaphytus collaris collaris* Say, one of *Phrynosoma cornutum* Harlan, and one of *Eumeces obsoletus* B. & G., in our lizard tight reptile house. On October 4, following a cold night, one of the lizards was found with its tail badly chewed, and moreover, the horned lizard and the skink could not be found. Each morning after this date other lizards were found to be deformed, missing, or dead, with no indication of their enemy until on the chilly evening of October 8 when a mouse was discovered in the building. It climbed under the rafters of the reptile house where several lizards were lying. As the mouse approached they opened their mouths and faced it squarely. The mouse always retreated before the

open mouths of the lizards, but soon darted swiftly around them and nipped their tails from behind. Whenever a lizard turned about and faced the mouse it ceased its attack and moved back. Three lizards were attacked in succession, all suffering injuries in their tails, but none were killed outright. By October 9 twenty of the lizards had disappeared, and nine of the rest were badly mangled. All of the victims which were examined had their tails injured, and some had as many as three of their feet gnawed away. The cloaca of one live animal was exposed. On October 12, when the mouse was caught and identified, only four of the lizards remained alive. These were allowed to stay in the reptile house and none of them were molested. It is interesting to note that the reptiles were not attacked earlier in the season before the weather turned colder. With cooler weather the lizards became inactive and somewhat defenseless, and were easy prey to the warm blooded mammal.

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BUTLER'S GARTER SNAKE IN NEW YORK

Butler's garter snake (*Thamnophis radix butleri* (Cope)) has been recorded from northwestern Pennsylvania, Ohio, Indiana and southern Michigan. The specimen from Port Allegany, McKean county, Pennsylvania, is from a locality scarcely twenty miles south of the New York-Pennsylvania state line and somewhat southeast of the recently created Allegany State Park in Cattaraugus county, N. Y.

On August 22, 1926, while collecting in the Tunungwam valley (near Limestone, N. Y.) which forms the lower eastern boundary of the park, I found a single injured specimen with the distinctive small head and color characters of Butler's garter snake. A recent careful examination of the specimen has confirmed the field identification and the species may be added to the fauna of New York.

The snake was collected in a low, wet meadow bordering Tunungwant creek and had very likely been injured by one of the cows pastured there. In spite of the severe cut that nearly severed the body a short distance in front of the vent, the snake was quite active and endeavored to escape by forcing its way beneath a low clump of grass.

The ground color in life was uniform dark brown, the dorsal stripe yellow, fading somewhat posteriorly. The lateral bands anteriorly encroach on the fourth row of scales but farther back are limited to the second and third rows. The scales are in 17 rows, counts being made back of the head, in the middle of the body and in front of the vent. The superior labials number 6 on each side; inferior labials, 7 on the right side and 8 on the left; ventrals 137, caudals 66; preoculars 1; postoculars, right side 2, left side 3; temporals 1-2, the lower of the posterior pair much reduced on the left side; total length 363 mm., tail 95 mm.

The short review of scale and other characters given above indicates that the specimen falls well within the limits of variation of the species and the narrow head and color pattern give further confirmation. The specimen bears number 3544 in the New York State Museum collection.

My companions of the collecting trip were Mr. Walter J. Schoonmaker of the State Museum staff and Professor W. P. Alexander of the Buffalo Society of Natural Sciences.

SHERMAN C. BISHOP

New York State Museum.

RICHIELLA TO REPLACE RICHIA AS NAME FOR GENUS OF DARTER

In a recent paper from the Bulletin of the U. S. Bureau of Fisheries (Vol. XLII, 1926, p. 105) the name *Richia* was proposed for a new genus of Darter

from Western North Carolina. Prof. Cockerell has very kindly called my attention to the fact that the name *Richia* is preempted by a genus of moths. Accordingly, I offer as a substitute the name *Richiella*, replacing *Richia*, type *Richiella brevispina* Coker.

R. E. COKER

Univ. of North Carolina.

THE SCALES OF THE DARTER *RICHIELLA BREVISPINA* COKER

I am indebted to the U. S. National Museum for scales taken from a paratype (45 mm. long) of *Richiella brevispina* Coker, from North Carolina. Since darter scales in general show few distinctive characters, I did not expect to find much of consequence; but apparently the *Richiella* scales are readily recognizable. They are about $865\ \mu$ long and broad, the measurement of length not including the long and sharp ctenoid spines; basal radii 9 to 11; laterobasal angles usually distinct. All the scales are brown, and the skin covering the apical part is densely pigmented, appearing dark brown by transmitted light.

My only scales of *Poecilichthys flabellaris* (Rafinesque) are from a small fish, 25 mm. long, from Cumberland Gap, Tenn. Compared with the *Richiella* scales they are smaller, clear hyaline, radii more closely spaced, skin with scattered minute brown spots. The laterobasal angles are rounded. Allowing for the difference in size of fish, it still appears that these scales are easily separable from those of *Richiella*. In my table of *Poecilichthys (Etheostoma)* scales, (Bul. Bur. Fisheries, Vol. XXXII, p. 156), the *Richiella* scales run to the group of *P. cragini* (Gilbert), *P. jessiae* (Jordan & Brayton) and *P. whipplii* (Girard). All these have clear hyaline scales: in *P. cragini* and *P. whipplii* the radii are closer than in *Richiella*; *P. jessiae* has stouter apical teeth.

Of the three fishes mentioned by Dr. Coker in his comparisons: *Poecilichthys exilis* (Girard) (*iowae* Jordan & Meek) has broader scales; pigment spots in skin as in *P. flabellaris*. *Cottogaster shumardi* (Girard) differs by the broad hyaline scales, with closer and finer circuli between the radii. I have no *Ioa vigil*, but *Ioa vitrea* (Cope) has small hyaline scales with few lateral circuli.

Thus, on the available evidence, *Richiella* appears to have good scale characters, not in themselves necessarily generic, but to be added to the other characters cited by Coker.

T. D. A. COCKERELL

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HYLA PHAEOCRYPOTA IN TENNESSEE

Sometime ago, Mr. Harold Cummins, now of Tulane University, very kindly presented me with a series of specimens collected by himself at Nashville, Tennessee. The salamanders of this collection have already been reported upon in my revision of the *Plethodontidae*, but a single small tree-toad has been awaiting identification. I finally presented this specimen to the Museum of Comparative Zoölogy, and now Dr. Barbour writes me "I have just had, from Washington, a specimen of *Hyla phaeocrypta* which has been carefully compared with the type. It agrees in every detail with the specimen from Nashville." Thus another locality may be added to those hitherto known.

E. R. DUNN

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ADDITIONAL NOTES ON *HYNOBIUS*

Since my review of the *Hynobiidae* in 1923 (Proc. Amer. Acad. Arts Sci., 58, p. 445 ff.) I have had opportunity to see the collection of these animals in the British Museum of Natural History, including the

types of *lichenatus* and *peropus*; a cotype of *nebulosus*, kindly lent me by Mr. Slevin of the California Academy of Sciences; and seven specimens sent me for identification by Prof. Junji Oyama, of the Kyushu Imperial University.

The type of *peropus* is No. 72.1.29.4, collected by Adams, locality "China or Japan". With it however is a specimen which agrees exactly with the original figure of *nebulosus* (Schlegel, Fauna Japonica, 1838) and which bears the same locality and collector and is No. 72.1.29.11. Thus it looks as if they both came from Kyushu. Furthermore the Kyushu specimens sent me by Prof. Oyama agree with the type of *nebulosus* and with the description and with my memory of *peropus*. The vomerine series of *peropus* is short, the animal is a dark adult male, and the fifth toe is rudimentary. But both the adult specimens from Oyama as well as the type from the California Academy are dark, the fifth toe is lacking on one side in the type and in one of my adults, it is lacking in one of my young from Oyama, lacking on one side and rudimentary on the other in another young one from Oyama, and it is rudimentary in one of the types in the Copenhagen Museum (No. 33). So that *peropus* should be relegated to the synonymy of *nebulosus*.

This means that the Hondo form I called *peropus* in 1923 takes the next oldest name, *lichenatus*, the type of which is clearly a young specimen of that form (*fuscus* Tago, *nigrescens* Stejneger), and has nothing to do with the animal from Hokkaido, which is often called *lichenatus*, but is really a very distinct form.

Additional specimens of *kimurai* from Hida Province, Hondo; cotypes of *naevius*; the types of *chinensis*; specimens of *retardatus* from Hokkaido; a young *lichenatus* from Nikko; and three *tagoi* from Tsushima are also in the British Museum collection, but call for no particular comment.

E. R. DUNN

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A NOTE ON EXHIBITING SNAKES

I have never seen snakes exhibited in glass tubes. I tried this method and found it has many advantages. The snake can be studied almost as well as if in the hands and very much more pleasantly. A much more accurate conception of the animals proportions can be gained than when it is coiled in a jar. The specimen can be sealed in with a blow torch, leaving a small air chamber and further trouble of evaporation is done away with. The tubes are easily exhibited, stored or shipped.

CHAPMAN GRANT
Major, Infantry

Univ. of Wichita,
Wichita, Kansas.

NOTES ON THE MATING OF SNAKES

Mr. O. P. Medsger reports, in January 12 *Copeia*, an interesting observation concerning the mating of male Hog-nosed snakes (*Heterodon platyrhinus*) with a dead female of the same species and asks if others have witnessed such a development. We can report two such occurrences and in as many species, neither of which was the Hog-nose.

On a collecting trip in June, at College Park, Maryland, trying to locate an ovoviviparous Garter snake in which the embryos were sufficiently well developed for class demonstration a female (*Eutaenia sirtalis*) was found with two males, judged by size and shape, following her, indicating that there was a sex-urge. Imprisoning the female in an open-wire fish bucket and transporting her to a nearby marshy spot, which was known to be inhabited by the species, she was held captive to await developments. One of the companions was captured and observed to be a male. The other and much larger one escaped unexamined.

The female was "set" at about ten o'clock A. M. At one o'clock P. M. three snakes of the same species were observed within five yards of the fish bucket, one fully

grown and the others barely over half grown. The smallest one was captured and observed to be a male. The ones that escaped were assumed to be males.

Moving the bucket to another part of the bog area, some twenty yards distant, and returning at about 4.30 P. M., things were found to be greatly disturbed, no doubt due to the close proximity of an "old swimming hole". There were two dead Garter snakes to one of which was attached a living snake in copulation. The second dead snake was a male. The heads of both dead specimens had been thoroughly crushed with about three inches of the anterior part of the body. Apparently some boy had killed them and used the heel of his shoes to finish the job. That the snakes had not been destroyed for quite a time was shown by the fact that both bodies were very sensitive, since they squirmed freely when touched. The female was unquestionably the one held captive in the fish bucket, conforming in size and shade of color. The bucket, removed quite some distance, was found with cover open and empty.

The male attached to the female garter snake was about one-half grown and a docile creature, quite unlike the female when alive. The latter was pugnacious and unyielding. She made little effort to escape as did most of the males but chose to fight it out. Imprisoned she was even more belligerent. To the mutilated body of the female the male remained attached for a period of eleven minutes after first being seen; how much longer he had been attached there was no way of determining. Upon completion of copulation the male rushed to cover without ceremony.

The second case observed in which mating occurred between a dead and living snake is recalled as a boyhood experience of the writer. A friend told a group of boys at school how he had killed the biggest snake he had "ever heard tell of"—so frightening was his report of the dimensions of the snake that it is not given here. This was at nine o'clock a. m. on a spring

day; year uncertain. At twelve o'clock a companion and myself went to the designated spot and saw, much to our consternation, two living snakes and a dead one. The living snakes were fairly large but not over three-fourths the length of the dead one, which, in turn, was fully five and a half feet long. One live snake was entangled with the dead one and the other seemed greatly agitated, at first yielding no ground to the boys, who were rather afraid of the combination before their eyes. Throwing stones and using a pole the free snake was put to flight but not killed, though there were intentions to that end at the time. The live attached snake did not seem to be especially bellicose and, after a short investigation, it was dispatched. Attempting to take the "trophies" back to school as proof positive of the fact that "snake doctors" did live, they fell apart. At the time we had no idea that coition was taking place, especially under the odd circumstances, but in light of subsequent events the mystery seems cleared up.

The snake was of the type called "mouser" in the section, Box Iron, Maryland, where the observations were made. There is little doubt but that it was the common Black snake (*Zamenis constrictor*) called, also, locally the Black Racer or the Blue Racer. Apparently in reply to Mr. Medsger's inquiry as to whether or not this freakish condition may hold for species other than *H. Platyrrhinus*, if the female is killed during the period of sex urge males will pair with her forthwith in many species. In the two instances cited here the females had not been dead more than three hours and the bodies had not become motionless at the time of mating.

It would seem from the experiment with the female in the cage and from general observations that at least certain females have means, probably odors, of attracting mates and that the range from which males are attracted is rather large. Literature on this subject is unusually meager and it may be that many observa-

tions have been made but not published. It would be interesting to hear more about the subject, indeed.

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A POSSIBLE SERPENT-LIKE MIMIC

Supported too ardently by some and attacked too bitterly by others, Bates' highly interesting theory of mimicry is nevertheless with us to stay. We no longer wish to call upon it to explain some of the mere coincidences of nature, yet we cannot afford to denounce it, as did one article reviewed some thirty years since in *L'Annee Biologique*, as "a romance based upon errors of observation or of interpretation."

Yet one must ask himself, why such formidable mimic models as the serpents might make, have been so slighted in nature. Is it because of their almost unique limbless forms? To be sure the coral snake would appear to serve as a model for the mimicking scarlet snake, and the copperhead for the puff adder, but that is within the order. Many birds imitate the serpent's hiss for the protection of themselves and nests, but until recently I could only have felt that nature had made very little use of possibilities held here for some bluff camouflage.

A few months ago, however, a friend came to me with a description of a caterpillar, he had found near the Tugaloo river, with the eyes and the mouth of a serpent traced on its body, which resembled in shape the head of a serpent, and the caterpillar when disturbed expanded the body in something of the manner of a puff adder. He furnished me with a sketch, and I was able to locate the insect as one of the *Papilio* or swallow-tails in its larval condition, probably, as suggested by Dr. Harrison G. Dyar, *P. palamedes* or *P. troilus*.

Now I do not care to fall into errors such as over-

enthusiastic students of mimicry have fallen into before, but if this be a case of real mimicry rather than a mere coincidence, then we have a new reason for the osmeteria located on the front part of these insects' bodies. Heretofore these forked, protrusile processes have been regarded as organs of defense, perhaps serving by means of the disagreeable odor to drive away parasitic flies. Now forked and colored differently from the body as is the osmeterium, and unfolding and extending from the front of the head in exactly the proper relation to the eye-spots to simulate a serpent's tongue, the organ may also serve as part of a mimicry make-up, which at some stage in the process of evolution may have been even more striking than at the present. Even yet, the osmeterium when protruding, though somewhat slowly, when viewed from above in connection with the eye-spots is nothing short of striking. Now the successful experiments of Tremén, Muller and Poulton in "matching larvae to their surroundings were largely conducted with *Papilio* larvae, while adults of the genus, both in the Old and in the New World, are highly susceptible mimics; in different parts of Africa the females of one species appear in six different forms five of them imitating other species! If, as Weissman and others seem to have proved, a bird can be frightened by an eye-spot on an insect, think of the added caution that a protrusile process imitating a serpents' tongue would call for. It may of course be one of those coincidences that have led the prejudiced to condemn Bates' theory too hastily, but in view of the few forms imitating the serpent it is worth calling attention to.

ANDREW L. PICKENS

Greenville, S. C.

INTERMEDIATE BETWEEN
BUFO FOWLERI AND *B. AMERICANUS*

Along the thousand foot line of elevation, and up to the crests of the Saluda Mountains that form the

line between North and South Carolina, the toads are divided between those having the spotted undersides of *B. americanus* and others having the immaculate undersides of *B. fowleri*. One specimen captured near the Reedy river in Greenville county, I submitted to the National Museum for full identification. I quote the finding of the government herpetologist in part: "The toad is nearest to *Bufo fowleri*. . . It is probable that the two species intergrade in South Carolina and in that case a definite identification of this toad is impossible."

If by species we are to understand a group that is not known to intergrade with some other species, and by subspecies groups that do intergrade, Yarrow, who in the Check-list of 1883, and Cope, who in 1889 classified Fowler's toad as *Bufo lentiginosus fowleri*, would appear to be more nearly right than Garman and others who have written it down as a species.

ANDREW L. PICKENS

Greenville, S. C.

NOTES ON THE REPTILES AND AMPHIBIANS OF THE DISMAL SWAMP

During a short stay, June 8-11, 1925, at Lake Drummond, in the Dismal Swamp, in company with Messrs. C. S. East of Washington, D. C., and H. L. Bowen of Broadwater, Va., the writer made the following notes on the reptiles and amphibians observed. With the lock keeper's house, at the head of the lumber canal leading from the lake, as a base, investigations were made in the area around the junction of Washington and Jericho ditches, on the north side of the lake, at Camp Drummond on the south side and in the immediate vicinity of the lumber canal. This area was formerly covered by cypress but this is now replaced by a dense growth of swamp gum, swamp maple and similar trees, closely interwoven with *Smilax* and *Toxicodendron*, forming an impenetrable tangle and

rendering collecting difficult. Other difficulties encountered were drought and extensive peat fires and these factors, together with the limited time, account for the brevity of this list, which may by no means be considered representative of the region. Many other species have been collected in the same area.

Bufo fowleri Garman. Although the *fowleri* note is prevalent in the toad chorus here, at this time, occasional *americanus* calls and some intermediate in character were heard. Here, as in the region around the District of Columbia, the only differentiating character, which is to be found at all permanent, between the toads singing in the approved *americanus* fashion and those adhering to the *fowleri* Gesand, is size. The *americanus* callers are invariably large, mature toads. The distinct *fowleri* calls are uttered by the smaller individuals.*

Bufo terrestris Bonaterre. Fairly abundant in this part of the Swamp and calling at the time.

Acris gryllus LeConte. Numerous everywhere in the vicinity of the lake, and the various canals and ditches.

Hyla versicolor LeConte. Found everywhere here. These frogs were heard calling from cypress trees situated in the lake at distance of 30-40 feet from the shore.

Hyla femoralis Latreille. One example was found on a fence rail near the lock keeper's house, on the night of June 10th. As far as I know, this frog has not been recorded so far north, heretofore.

Rana sphenocephala Cope. Leopard frogs in this locality have all the characteristics of *sphenocephala*. They suggest *pipiens* even less than the leopard frogs of the Potomac drainage do. They seem the most numerous amphibians here.

*Mr. Viosca, of New Orleans, La., informs me that he has encountered difficulties in the determination of *Bufo fowleri* and *B. americanus* in his region, similar to those I have encountered in the Dismal Swamp and the Potomac drainage area.

Rana clamitans Latreille. Fairly plentiful along the lumber canal but not observed at the lake.

Rana virgatipes Cope. Rather common in the sphagnaceous areas around the lake and abundant in the old lumber canal. The call of this frog was heard on the night of June 10, during a light rain.

Stereochilus marginatus Hallowell. One specimen of this salamander was found, at the junction of Washington and Jericho ditches.

Chrysemys picta Schneider. Although several species of turtles have been recorded from the swamp, this was the only one observed. It was quite common in the canals and ditches.

Lampropeltis g. getulus Linn. One adult—found at Camp Drummond, in the act of devouring eggs of *Eumeces*.

Natrix sipedon fasciata Linn. The water snakes of the Dismal Swamp are typical of the southern race. They were abundant at every station visited.

Eumeces fasciatus Linn. Numerous; several batches of well incubated eggs were found.

Leiolopisma laterale Say. An adult found near Washington ditch and a batch of well incubated eggs found in the wall of the lumber canal, add this lizard to our list.

It may be of interest to note that we were assured by residents that many species secured by collectors in earlier visits to this region, are still abundant. Although we failed to find either *Siren* or *Amphiuma* through working suitable stations thoroughly, we were informed that both species are common in the proper season. *Crotalus horridus* was reported to be common on the ridges or "glades" in the Swamp. August, 1926, I received a letter from Mr. W. H. Hull, a resident in Wallaceeton, Va., announcing the discovery of a rattlesnake over five feet long, and differing from the common rattler of the region. From his very clear description this would seem to be *Crotalus adamenteus*.

Mr. Bowen, who remained in the Swamp after my return to Washington, reports a specimen of *Farancia* from a station near Suffolk.

MAURICE BRADY

Washington, D. C.

A NOTE ON THE EGG-LAYING OF
ELAPHE OBSOLETA OBSOLETA (SAY)

On July 13, 1926, the writer captured a large female *Elaphe obsoleta obsoleta* (Say) which was sunning itself on a fallen sapling along Loyalhanna Creek, near Rector, Westmoreland county, Pennsylvania. This specimen was placed in a cage in the laboratory with a small *Coluber constrictor constrictor* (L.). The *Elaphe* did not climb as easily as the *Coluber*, and frequently attempted to burrow its head into the shallow sand.

On the morning of July 26, I found the snake coiled about a pile of seventeen eggs. The eggs were roughly arranged in two layers with the axes pointing in various directions. When the female was moved so that the eggs could be counted and measured she made two blows at my hand with the mouth closed, but offered no more resistance. After the snake was replaced she remained coiled about the eggs during the day. The next morning, however, the eggs were found scattered over the sand and the female paid no attention to them.

The eggs were pure white in color, and the egg "shell" was much tougher than that of a turtle's egg. The average length was 42.7 mm.; the greatest length 47 mm.; and the smallest length 39 mm. The average diameter was 23 mm.; the greatest diameter 24 mm.; and the smallest diameter 22 mm.

One egg was opened during the first day. The embryo was coiled and the beating of the heart could be seen quite plainly. The remaining eggs were placed in wet sand and moss and kept at a temperature that probably averaged less than the outdoor temperature.

Embryos were killed and fixed at regular intervals until September 24th when the last egg was opened. Four of the eggs showed no signs of development when opened and were likely sterile. During the period of incubation the increase in diameter was much greater than the increase in length. The last egg measured 50 x 29 mm. when opened. The living embryo which it contained measured 275 mm. in length and had a maximum diameter of 10 mm. This embryo must have been almost ready to hatch. The scales were well developed. The ground color was dirty white and the dorsal blotches were gray.

It was noted that practically all growth in length of the eggs was due to cracks which almost encircled the eggs in some cases. These cracks may have been due to excessive moisture in the incubator, yet earth and sawdust, in which eggs of this species have been found, may hold a greater amount of moisture. If these encircling cracks are present normally the young snakes would have an easy means of escaping from the eggs.

The present case demonstrates that this species in Pennsylvania, at least, may lay a month earlier than "the latter part of August or early part of September" as Surface stated and that the date of hatching may be later than the middle of September. Probably the period of incubation varies greatly with local conditions.

M. GRAHAM NETTING

Carnegie Museum.

LATE ACTIVITY OF *HETERODON CONTORTRIX* (L.)

On January 17, 1927, the writer received a specimen of *Heterodon contortrix* (L.) which had been captured December 2, 1926, near Weikert, Union county, Pennsylvania, by William Nowell, Sr. Mr. Nowell stated that while deer hunting he had noticed the

snake with the forward third of its body protruding from a hole in the rocky hillside. When captured the snake did not inflate the body, blow, or play "possum" as this species might be expected to do. December 2 followed a short cold spell, but the day itself was warm and sunny with no snow upon the ground.

According to Mr. Nowell residents of Union County said that they "had never seen a snake like it", but that it was probably a big Copperhead. Surface recorded one specimen from the same county, however. The specimen was unusually large measuring 1003 mm. in length. It had been kept alive until a short time before I received it, at which time the ground color in the neck region was reddish shading to red brown on the tail. The blotches were dark black and the ventral surface reddish. Mr. Nowell stated that the belly was "vivid pink" in life.

M. GRAHAM NETTING

Carnegie Museum.



